

Application No.: 10/690,565

REMARKS

These amendments and remarks are being filed in response to the final Office Action dated November 30, 2006. For the following reasons this application should be allowed and the case passed to issue.

No new matter is introduced by this amendment. The amendment to claim 1 is supported by the Specification at page 4, lines 5-30 and Figs. 1, 2A, and 2B.

Claims 1 and 3-8 are pending in this application. Claim 8 was withdrawn pursuant to a restriction requirement. Claims 1 and 3-7 are rejected. Claim 1 has been amended in this response. Claim 2 was previously canceled.

Restriction

Upon the allowance of the device claims, Applicant respectfully requests rejoinder, examination, and allowance of method claim 8, pursuant to the rejoinder provisions of MPEP § 821.04.

Claim Rejections Under 35 U.S.C. § 103

Claims 1, 3, 4, 6, and 7 were rejected under 35 U.S.C. 35 § 103(a) as being unpatentable over Mayer et al. (U.S. 2004/006554) in view of Takekuma et al. (U.S. 5,580,607) or Shirakawa et al. (U.S. 6,222,161) and in view of Holsteyns et al. (US 2004/0045589). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested. The following is a comparison between the present invention, as claimed, and the cited prior art.

An aspect of this invention, per claim 1, is a substrate cleaning device comprising a substrate holder to hold an edge of a substrate. A plurality of heat sources are opposite to and separated from a surface of the substrate with a gap, and each are used for heating or cooling. A temperature controller is provided to control a temperature of the plurality of heat sources to

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allow the plurality of heat sources to be set at different temperatures independently of each other. A cleaning liquid filling section is disposed within a through hole provided to extend vertically through a center of the plurality of heat sources for filling the gap with a cleaning liquid via the through hole. A plurality of heat sources each have a surface opposite to the substrate along a different concentric circle. The temperature of the surface of the substrate in contact with the cleaning liquid that fills the gap is increased or decreased via the cleaning liquid through a heating or cooling operation of the plurality of heat sources.

The Examiner asserted that Mayer et al. disclose a substrate cleaning device (Figs. 9 and 10) comprising a plurality of heat sources (832, 838), a temperature controller (paragraph [0082]), substrate holder (806), liquid filler (826), concentric heaters (Figs. 9 and 11), rotating the substrate (866), and chuck pins (paragraph [0053]).

The Examiner acknowledged that Mayer et al., however, do not explicitly disclose the concentric heaters, holding the edge of the substrate, and the composition of the chuck pins. The Examiner relied on the concentric heater teachings of Takekuma et al. and Shirakawa et al. to assert concentric heaters would have been obvious. The Examiner relied on Holsteys et al.'s teaching of holding a substrate at its edges to conclude that the edge holding apparatus would have been obvious.

The combination of Mayer et al., Takekuma et al., Shirakawa et al., and Holsteys et al. do not suggest the claimed substrate cleaning device. Mayer et al. do not teach providing a cleaning liquid filling section disposed within a through hole provided to extend vertically through a center of the plurality of heat sources for filling the gap with a cleaning liquid via the through hole, as required by claim 1. The present invention, allows the reaction of a film on a semiconductor surface with the cleaning liquid by providing the cleaning liquid from the side of a

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plurality of heat sources, and heating or cooling the cleaning liquid by means of a plurality of heat sources. The temperature of the plurality of heat sources can each be independently set to provide a temperature gradient. Furthermore, by providing a plurality of temperature settings within a plane, the temperature distribution on the substrate surface can be controlled. As a result, the evenness of a surface within the plane after a cleaning process can be improved.

Mayer et al. teach that cleaning liquid inlet tubes are provided between adjacent heat sources. Mayer et al., however, is silent about the arrangement of the plurality of heat sources along different concentric circles. Takekuma et al., Shirakawa et al., and Holsteins et al. do not cure the deficiencies of Mayer et al.

Obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either explicitly or implicitly in the references themselves or in the knowledge readily available to one of ordinary skill in the art. *In re Kotzab*, 217 F.3d 1365, 1370 55 USPQ2d 1313, 1317 (Fed. Cir. 2000); *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988); *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992). There is no suggestion in Mayer et al., Takekuma et al., Shirakawa et al., and Holsteins et al. to provide a substrate cleaning device comprising a temperature controller provided to control a temperature of the plurality of heat sources to allow the plurality of heat sources to be set at different temperatures independently of each other, a cleaning liquid filling section disposed within a through hole provided to extend vertically through a center of the plurality of heat sources for filling the gap with a cleaning liquid via the through hole, wherein the plurality of heat sources each have a surface opposite to the substrate along a different concentric circle, and the temperature of the surface of the substrate in contact with the cleaning liquid that fills the gap is

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increased or decreased via the cleaning liquid through a heating or cooling operation of the plurality of heat sources, as required by claim 1.

The only teaching of a substrate cleaning device comprising a temperature controller provided to control a temperature of the plurality of heat sources to allow the plurality of heat sources to be set at different temperatures independently of each other, a cleaning liquid filling section disposed within a through hole provided to extend vertically through a center of the plurality of heat sources for filling the gap with a cleaning liquid via the through hole, wherein the plurality of heat sources each have a surface opposite to the substrate along a different concentric circle, and the temperature of the surface of the substrate in contact with the cleaning liquid that fills the gap is increased or decreased via the cleaning liquid through a heating or cooling operation of the plurality of heat sources, is found in Applicant's disclosure. However, the teaching or suggestion to make the claimed combination and the reasonable expectation of success must both be found in the prior art, and not based on applicant's disclosure. *In re Vaack*, 947 F.2d 488, 20 USPQ2d 1438 (Fed. Cir. 1991).

Claim 5 was rejected under 35 U.S.C. 35 § 103(a) as being unpatentable over Mayer et al. in view of Takekuma or Shirakawa et al. and Holsteins et al., and further in view of Hasegawa (US 5,667,622). This rejection is traversed, and reconsideration and withdrawal thereof respectfully requested.

The Examiner acknowledged that Mayer et al. do not disclose Peltier devices. The Examiner relied on the Hasegawa et al. teaching of Peltier devices to assert that it would have been obvious to use Peltier devices in the apparatus of Mayer et al. because they are useful for providing localized temperature control of each region of the substrate.

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The combination of Mayer et al., Takekuma et al., Shirakawa et al., Holsteins et al., and Hasegawa et al. do not suggest the claimed device because Hasegawa et al. do not cure the deficiencies of Mayer et al., Takekuma et al., Shirakawa et al., and Holsteins et al., as Hasegawa et al. do not suggest, a cleaning liquid filling section disposed within a through hole provided to extend vertically through a center of the plurality of heat sources for filling the gap with a cleaning liquid via the through hole wherein the plurality of heat sources each have a surface opposite to said substrate along a different concentric circle, and the temperature of the surface of the substrate in contact with the cleaning liquid that fills the gap is increased or decreased via the cleaning liquid through a heating or cooling operation of the plurality of heat sources, as required by claim 1.

The dependent claims are allowable for at least the same reasons as independent claim 1 and further distinguish the claimed invention.

In view of the above remarks, Applicant submits that this application should be allowed and the case passed to issue. If there are any questions regarding this Amendment or the application in general, a telephone call to the undersigned would be appreciated to expedite the prosecution of the application.

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To the extent necessary, a petition for an extension of time under 37 C.F.R. § 1.136 is hereby made. Please charge any shortage in fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account 500417 and please credit any excess fees to such deposit account.

Respectfully submitted,

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